

NOTES ON THE RAINFALL OF SINGAPORE.

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The amount of Rainfall in Singapore having been a topic very frequently discussed, it is with some diffidence the accompanying tables are submitted. Any one who applies himself to the study of this subject, cannot but feel, at the very threshold of his labours, how little he has to help him, and how difficult it is to arrive at any definite conclusion.

For some years back, I have tried to collect as much information as was possible on the rainfall of this Settlement, but find that very little indeed can be done in this matter. Whatever records of rainfall may have been kept in times past, all that are at present available, are:—

- 1.—Statements of the number of rainy days in each year, from 1820 to 1825.
- 2.—A Statement of Rainfall for the year 1835.
- 3.—Observations made at the Singapore Observatory, for the years 1841 to 1844, and for the first nine months of 1845.
- 4.—After a large gap of seventeen years, Mr. J. D. VAUGHAN'S Observations, from 1862 to 1866, whose returns were published quarterly in the local *Government Gazette*.
- 5.—Meteorological Observations, which were commenced by the late Dr. RANDELL, Principal Civil Medical Officer, Straits Settlements, in 1869, and which are maintained to the present time. The Monthly Returns of these were published for many years in the *Government Gazette*, but of late years they have been discontinued. The P. C. M. O., however, supplies the press, public institutions, &c., with a yearly copy of Monthly Returns, both of Meteorological Observa-

tions, and of the Rainfall, which is now registered at seven stations. Annual Returns are also to be found in the Blue Books.

- 6.—Lastly, but not least, a Register of Rainfall kept by Mr. A. KNIGHT, since 1864, at Mount Pleasant, Thompson Road (about three miles distant from Town), and I must here express my deep obligation to him for his kindness in supplying me with the required information, and for revising the Tables of his range.

Though the rainfall at Singapore is now registered at seven stations, it is not intended to notice the whole of them, nor to act on the *means* of the total registered rainfall, but only to take the returns of the Criminal Prison, extending over a period of twelve years, as a register of rainfall in the town; and Mr. KNIGHT's returns, extending over a period of seventeen years, as a register of rainfall in the country; as they are the two best sources of information for the consideration of this question.

From time to time, letters have appeared in the local newspaper, asserting that the extensive clearing of forests in Singapore, and the adjoining mainland of Johor has materially affected the rainfall. In proof of this, the experience of the "oldest inhabitant" is appealed to, to bear testimony to the incessant daily fall of rain of former years, and the conclusion is hence drawn, that the rainfall will be altogether suspended if something be not, without delay, undertaken to stop this disafforestation of the island and peninsula.

It is not the object of the writer to enter into any lengthy discussion on this point. The sole object of this compilation of tables is, to bring together sources of information on this subject which are of value, but are now scattered, extending over many books and *Gazettes*, buried out of sight, and thus practically lost for convenient reference and research under this head in the future.

But, it may be safely advanced, that Singapore is *not* dependent on its extent of forests, or contiguity to forests, for its rain supply, but to its geographical position. In the *Journal of the Indian Archipelago*, vol. 2, page 457, Dr. LITTLE, writing on the Medical Topography of Singapore so far back as 1848—thirty-three years ago,—gives the average annual rainfall as being 92.697 inches; arriving at this conclusion from the records of the Singapore

Observatory during 1841 to 1844—a period of four consecutive years; and the average annual number of wet days was set down at 185 days, or a little over one-half the year, this last conclusion being drawn from the observations of broken periods as below:—

During 1820 there were 229 wet days*

„	1821	„	203	„
„	1824	„	133	„
„	1825	„	171	„
			739	„

185 average of 4 years,

but searching for information on this point, I am enabled to fill up the break, and we have:—

During 1820 there were 229 wet days

„	1821	„	203	„
„	1822	„	218	„
„	1823	„	208	„
	1824	„	136	„
„	1825	„	171	„
			1,165	„

giving 194 as the average of 6 years.

It would appear, that during the early days of the Settlement, which only dates from 1819, from want of a rain gauge (due to the difficulties attendant on first occupation, and of getting things from India), all that was attempted, was, to keep a register of the readings of the thermometer and barometer (which every ship carried), and a note only made of the number of fair days and wet days. The earliest record of a register of rainfall that can be traced is that of 1835.

It is, however, interesting to note that the accepted average annual rainfall of 1841 to 1844, has not been affected notwithstanding the extensive clearing of forest that must have taken place during the past forty years, for the average of Mr. KNIGHT's register (Table III.) keeps a little above it, viz., 93.94 inches, while the

*By *wet or rainy days*, is understood days on which rain in more or less varying quantities from one-hundredth of an inch has been registered.

average of the Prison register is more markedly in excess, being 99.96 inches (Table II.). The average annual number of wet days, as will be seen from Tables IV. and V., has only to a small extent been diminished in the Prison Register, but exceeded in Mr KNIGHT'S. That there are seasons of marked falling off of the rainy season, is noticeable so early as 1824; and the order of their recurrence is worth studying. The *smallest* number of wet days, as recorded, is 109 in 1877, during which year, as will be seen on referring to Table VIII., the second half of the South-West monsoon was almost a complete failure, while the *greatest* number of wet days in recent years was 212 days in 1871, and 244 in 1879 at Mr. KNIGHT'S place: this last even exceeding that given for 1820.

The heavy falls of rain do not appear to be confined to any particular month. They are most frequent during the first half of the North-East monsoon, that is, the months of November, December and January. There are no recorded heavy rainfalls for February or July, and, but for one instance recorded by Mr. VAUGHAN, none in March also. These are best shown as below:—

	Mr. VAUGHAN'S register.	Prison register.	Mr. KNIGHT'S register.
January, ...	1	2	4
February, ...	...	...	...
March, ...	1	...	...
April, ...	1	...	1
May, ...	...	2	2
June, ...	...	1	1
July, ...	...	...	...
August, ...	...	2	2
September, ..	...	1	1
October, ...	...	1	...
November, ..	...	2	1
December, ..	2	1	5

DROUGHTS.—This word must be used guardedly, and can only apply in a limited sense. I have, therefore, shown it in Tables VI. and VII. as *the greatest consecutive number of days without rain in each month*. According to Table VI., the greatest interval without

rain has been only seventeen days; but in considering this, allowance has to be made liberally; for instance, from the 22nd September, 1877, to 8th October, there was no rain, but between 9th and 23rd October, there were small drizzlings of rain, viz. :—

On the 9th to the extent of 0.09 inches.

„	10th	„	0.03	„
„	14th	„	0.03	„
„	22nd	„	0.05	„

the first shower being on 23rd, when 0.35 was registered, so that though there were days of small droppings of rain which intervened, the season of dryness was actually from 22nd September to 23rd October; and, in like manner, other instances may be adduced. But even with this drawback, these tables will, I think, be found of value, as they give a fair representation. The greatest interval without rain ranging from 7 to 17 days in town, and from 7 to 23 days in the country.

It is not possible to obtain information of this nature from condensed annual tabulated statements of former years. Mr. VAUGHAN's are the earliest available for this sort of analysis, and from them I gather, that the longest interval recorded by him as being without rain, was from 27th January to 2nd March, 1864, or 35 days; during which period *no* rainfall was registered, though on the 23rd and 26th February there was a "small sprinkling," but nothing appreciable by the gauge. Mr. KNIGHT, whose register commences at this time, also notes this extended drought of 35 days, the showers registered during this interval being two, viz., one to the extent of 0.03 inches, and the other to the extent of 0.14 inches, this last only reaching Mr. VAUGHAN, at River Valley Road, as a "small sprinkling," not appreciable. Mr. KNIGHT, in a note when returning his tables which were sent for his revision says: "Your table has the disadvantage of not showing droughts when they extend from one month to another." This is fully admitted, and, as explained above, the tables are only to give an idea of the ordinary number of consecutive days without rain.

SEASONS.—In 1874, the late Dr. RANDELL, P. C. M. O., in submitting his Meteorological Report for 1873, proposed that, for the sake of convenience, the year should be divided into three periods of four months each; which he designated as *variable* for the first third, *dry* for the second third, and *wet* for the remaining portion.

With all deference for the opinion thus expressed, I am sure it will be evident to all who consider the subject, that the wisest plan is not to force or mould natural operations to artificial arrangements, but by studying Nature's plans, and, basing our calculations thereon, to get some insight (small though it be) into the wondrous and wise laws which govern this world.

We find one great influence at work, viz., the *Monsoons*, and in any observations from which correct inferences are intended to be drawn, this must not be lost sight of. The difficulty that one meets, at the very beginning of this enquiry, arises from the questions—"When do the monsoons commence?" "Is there a fixed day?" "How are they governed?" MAURY, in his *Physical Geography of the Sea*, says: "Monsoons are, for the most part, trade winds deflected, when, at stated seasons of the year, a trade wind is turned out of its regular course, as from one quadrant to another, it is regarded as a monsoon." *What then is the stated season?* This has engaged the attention of many; the "Wiseman" said "The wind goeth toward the South, and turneth about unto the North; it whirleth about continually, and the wind returneth again according to his circuits;" but, *when* that stated season actually commences, is still beyond our telling.

The monsoons we have to deal with, are the North-East and South-West. To quote again from MAURY: "A force is exerted upon the North-East trade winds of that sea by the disturbance which the heat of summer creates in the atmosphere over the interior plains of Asia, which is more than sufficient to neutralize the forces which cause those winds to blow as trade-winds, it arrests them and turns them back." "These remarkable winds blow over all that expanse of Northern water that lies between Africa and the Philippine islands. Throughout this vast expanse, the winds that are known in other parts of the world as the North-East trades are here called monsoons, because, instead of blowing from that quarter for twelve months as in other seas, they only blow for six. During the remaining six months they are turned back as it were, for instead of blowing towards the Equator, they blow away from it, and instead of North-East trades we have South-West monsoon."

But, although the day of the commencement of either monsoon is not a fixed one, as far as is at present known, there is a time

when there is a turn, a "backing down" and "back to back" of the North-East and South-West winds, which differs, of course, according to latitude. In higher latitudes, the North-East monsoon may be said to have fairly set in during October, but for our low latitude it may roughly be put down as being established only in November. From November to the end of January, the North-East wind is blowing steadily; from February to April the struggle between North-East and South-West monsoons commences, and the result is *variable* breezes; from May to July, the South-West monsoon is the prevailing wind, losing its steadiness from August, till it is lost again in the next North-East monsoon by the end of October.*

Acting, therefore, on this natural division of seasons, a table has been prepared shewing the rainfall of each quarter (Table VIII.) thus arranged, and it will be noticeable, that the fall of the first portion of the North-East monsoon is (with only one exception in eleven years' registration) uniformly *greater* than the corresponding portion of the South-West monsoon; while the second half of the North-East monsoon is *less* than the corresponding season of the South-West; and that the fall of rain for the entire North-East monsoon is on the whole *greater* than that during the entire South-West: which may perhaps be accounted for by the North-East monsoon coming over a large watery expanse, unbroken by any high lands, whereas the rain-bearing clouds of the South-West monsoon are intercepted to a great extent by the island of Sumatra in our Southern and Western vicinity.

Under the present limited knowledge of Meteorology, it is almost impossible to lay down definite rules for guidance in making forecasts of weather except with the aid of the telegraph.† Men of science with skilfully arranged, delicate, sensitive instruments to detect every change of weather, &c., have devoted many years to its study, only to find themselves baffled. The Astronomer is far

* If it were possible to keep a constant hourly register of the wind as regards its direction, &c., the duration of each monsoon, and the changings from one to the other would be better understood.

† In America (United States) and in Europe, telegraphic reports of the state of the weather from various parts are received hourly at the head offices, and sometimes preparations can be made against impending bad weather. Some years back, a proposal was made from Amoy to arrange for a daily telegraphic report from Singapore and Batavia, but it has not come to anything.

ahead of the Meteorologist, in that he can foretell with wonderful precision the movements of the stars and planets, proving thereby of great assistance to the navigator, who determines his position at sea, by night as well as by day, with the aid of the carefully prepared tables of the Nautical Almanac.

The Astronomer knows what influences the planets bear on one another, and on this globe; singly, or in conjunction during their movements through space; but the Meteorologist is still only on the borders of the vast unknown, and cannot compete with the Astronomer; he is still only a recorder of events passing and past, and not a diviner of events to come. Though the barometer is, in some latitudes, a faithful monitor, too often, the change predicted comes about faster than it was anticipated, and he is left only to register that which *has* happened.

Notwithstanding all that has been done to get together such information as may help to unravel the mystery of the laws which govern Nature, there is much more still wanting; but we may entertain the hope, that in the perhaps not distant future, by the aid of faithfully recorded meteorological registers which at present seem of little value, some KEPLER or NEWTON will yet arise, and discover the effects of solar spots, and the influences of the celestial objects on our atmosphere from *without*; and the workings of this vast globe, generating, and maintaining electricity, magnetism and and a host of other operations from *within*,* causes which operate no doubt in some recurrent order, guided and governed by solar and lunar cycles.† We may hope, that when it is understood how these causes act and react on one another, certain rules will be

*In Astronomy, KEPLER in 1609-1618 could never have arrived at the conclusions known as his LAWS, but for the labours of TYCO BRAHE, who, about fifty years previously, laboured to collect a large amount of correct, trustworthy, facts uninteresting perhaps to many, but invaluable to KEPLER. With the advantage of the labours of these two, NEWTON, about fifty years later, was enabled to announce his Laws of Gravitation and the movements of the planets, &c., in their orbits; laws which have proved to be so correct, that about a hundred and fifty years later, with the Laws of NEWTON as the basis of operation, ADAMS in England, and LEVERRIER in France, fixed the position of an unknown disturber of the movements of *Uranus*, and discovered it to be the planet which has been named *Neptune*.

† Herr SCHWABE of Dessau calculates the recurrent cycles of Solar Spots at eleven years. A *solar cycle* is 28 years, and a *lunar cycle* 19 years.

framed, as has been done for the Astronomer, whereby that which now appears dark, doubtful and difficult, will be made clear, certain and simple; and the perils of the navigator at sea, the devastating effects of hurricanes on land, and the distress and want of famines will be foreseen and provided against with certainty.

Admiral FITZROY, in his Weather Book, says: "Having accurate statistical observations of the various currents of air at selected outlying stations shewing pressure or tension, temperature and relative dryness, with the direction and estimated horizontal force of wind at *each place simultaneously*, the dynamic consequences are already measurable approximately on geometric principles, and, judging by the past, there appears to be reasonable ground for expectation that meteorologic dynamics will soon be subjected to mathematical analysis and accurate formulas." And again: "Certain it is, that although our conclusions may be incorrect and our judgment erroneous, the laws of Nature and the signs afforded to man are invariably true. Accurate interpretation is the real deficiency."

It appears from superficial observations, and the inferences one can draw from having only a very faint idea of this subject, that until at least there are trustworthy records of periods extending over two or three solar cycles, it would be futile to hazard, even by guessing, a rule by which the Rainfall of Singapore can be calculated upon. If, therefore, this Society will endeavour to collect all possibly accurate returns of the rainfall, &c., it will be doing great service to those who may study the Meteorology of this part of the world from the tables thus preserved, when this generation shall have passed away.

Nothing in this paper is intended to dispute or question the accepted and well known fact, that disafforestation of a country *does* bring about a change of climate by diminishing rainfall, but before concluding, it would be well to urge, for the consideration of those who may be interested, the advisability of providing against another result of extensive clearings of forests, viz., the failure of the supply of fuel, not to speak of the timber supply for building, &c., in the future. If disafforestation does not influence the rainfall of this Settlement, it will certainly have some influence on the supply for the above-mentioned demands. The number of local steam engines on land and at sea, consuming large

quantities of firewood daily and the wants of an increasing population, will, in time, tell on the supply, and it is the incumbent duty of the present occupants, and of the Government too, to make due provision for the indispensable wants of those yet to come, by planting many of the hillsides, now entirely denuded of vegetation, with suitable forest trees.*

* I cannot sufficiently express my thanks for the convenience of having access to the valuable books of reference in the Raffles Library and to the books of the Logan Library for much of the information gleaned therefrom.

TABLE I.

Available Records of Rainfall at Singapore previous to 1869.

Rainfall registered at the Singapore Observatory. From Journal of Indian Archipelago, — <i>On the Medical Topography of Singapore.</i>							Rainfall registered by J. D. VAUGHAN, Esq., at River Valley Road, Singapore. From the Government Gazette.						
1835	1841	1842	1843	1844	1845	Aver- age.	1862	1863	1864	1865	1866	Aver- age.	
inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	
January, ...	18.5	3.750	22.585	18.070	10.219	5.750	12.075	8.90	10.17	6.41	6.67	5.75	7.59
February, ...	1.5	6.750	10.900	3.050	6.923	4.225	6.369	12.58	5.12	...	2.86	5.85	5.28
March, ...	10.8	5.009	7.220	8.045	4.150	3.030	5.491	10.92	7.10	4.83	3.99	5.56	6.48
April, ...	3.2	3.019	10.071	5.645	12.300	7.250	7.657	2.71	6.09	5.53	5.61	12.59	6.51
May, ...	5.0	6.095	9.003	9.000	7.775	5.025	7.379	4.37	5.77	2.77	3.13	9.62	5.13
June, ...	6.5	7.490	6.320	2.270	6.025	5.375	5.496	5.38	5.31	2.38	6.51	4.78	4.87
July, ...	4.6	7.228	5.098	8.500	5.890	3.395	6.022	7.45	7.85	5.64	2.62	8.63	6.44
August, ...	6.9	7.095	6.025	5.545	5.750	6.750	6.233	5.70	5.50	12.39	13.12	9.07	9.16
September, ...	3.6	4.220	4.250	4.055	5.075	10.250	5.570	10.51	5.20	9.49	4.00	7.17	7.27
October, ...	10.8	4.070	21.005	12.145	10.200		11.844	9.36	9.50	12.66	7.86	12.60	10.40
November, ...	7.4	12.225	9.420	9.560	6.060		9.316	4.80	8.28	11.63	6.58	6.95	7.65
December, ...	20.7	6.175	4.350	6.415	8.750		6.422	16.83	10.73	13.77	9.50	3.94	10.96
Total, ...	99.5	73.126	116.247	92.300	89.117		89.874	99.51	86.62	87.50	72.45	92.51	87.73
Average of 4 years, 92.697 inches.							Heaviest rainfall in 24 hours, ...						
							Date, {						
							5.60	2.66	2.86	3.98	7.68	7.69	
							20th	31st	24th	2nd	14th	14th	
							Dec.	Mar.	Dec.	Jan.	April.	April, 1866.	

TABLE II.
Rainfall registered from 1869 to 1880 at the Criminal Prison, Brass Basa Road, Singapore.

Months.	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	Average of 12 years.
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
January, ...	3.93	18.25	11.56	2.83	7.81	3.58	2.53	4.31	2.81	13.81	20.00	4.46	7.99
February, ...	3.23	7.80	7.27	8.25	10.94	2.72	6.35	2.61	7.04	6.28	8.45	7.71	6.55
March, ...	3.37	3.15	14.05	3.36	11.44	2.61	20.93	4.35	4.78	1.90	12.36	7.67	7.50
April, ...	9.23	8.81	3.33	3.97	10.90	5.70	8.70	8.52	1.80	9.83	6.65	13.37	7.57
May, ...	9.19	5.01	4.13	6.13	8.13	4.54	5.69	7.95	3.60	11.17	12.00	8.53	7.17
June, ...	6.81	11.51	5.56	5.03	5.54	5.91	8.14	13.34	13.53	4.13	9.16	5.74	7.87
July, ...	5.42	5.11	12.17	5.44	3.14	5.92	4.53	4.51	7.21	5.14	4.57	8.86	6.00
August, ...	12.31	11.36	8.51	9.27	6.55	11.82	9.41	9.84	4.78	17.36	8.42	9.10	9.89
September, ...	3.13	12.62	9.12	12.82	3.05	9.74	9.58	7.72	3.27	3.27	6.48	4.20	7.08
October, ...	5.11	9.99	14.92	6.22	8.30	8.83	9.74	12.55	1.68	6.57	14.21	8.86	8.92
November, ...	8.24	11.50	14.63	13.52	15.72	20.53	16.16	15.88	5.21	10.73	8.21	18.26	13.21
December, ...	20.66	18.13	15.19	7.98	5.68	7.55	6.72	9.90	5.48	9.76	8.02	7.40	10.21
Total annual rainfall, ...	90.63	123.24	120.44	84.82	97.20	89.45	108.48	101.48	61.19	99.95	118.53	104.16	99.96
Greatest rainfall in 24 hrs. } Date, {	5.61 31st Aug.	6.25 26th Dec.	4.20 8th Jan.	3.10 12th Sept.	4.08 21st May.	3.86 28th Nov.	4.25 26th Oct.	4.75 26th May.	2.70 7th June.	4.16 27th Aug.	3.71 20th Jan.	3.71 11th Nov.	6.25 29th Dec. 1870.

Greatest annual rainfall, ... 123.24 inches in 1870
 Smallest do., ... 61.19 " 1877.

TABLE III.
*Rainfall registered by A. Knight, Esq., from 1864 to 1880, at Mount Pleasant,
 Thompson Road, Singapore—distance from Town 3 Miles.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	Greatest Rain- in 24 hours.	Date.
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	
1834, ...	5.79	0.17	3.90	5.01	1.66	5.14	6.24	12.33	7.83	11.97	11.36	11.94	86.34	2.25	23rd Dec.
1865, ...	5.99	2.84	4.99	7.82	5.16	5.50	3.48	16.07	4.88	9.50	8.31	9.40	83.67	3.85	2nd Jan.
1866, ...	4.55	5.88	5.82	13.48	7.87	4.65	7.73	11.15	5.65	12.58	6.82	2.36	88.54	3.93	15th April.
1867, ...	5.07	5.53	3.77	16.44	5.11	7.20	6.10	3.14	8.90	5.82	10.13	12.80	90.01	3.78	2nd Dec.
1868, ...	10.66	3.37	5.45	7.58	3.97	3.18	8.03	5.06	3.47	5.55	11.12	8.11	75.55	2.95	17th Jan.
1869, ...	4.51	2.06	7.18	7.89	12.54	6.85	6.08	11.00	4.11	4.80	9.0	19.46	95.56	5.54	10th Dec.
1870, ...	16.30	12.49	7.60	9.54	3.00	12.08	2.75	5.67	9.86	6.63	15.10	15.91	116.93	6.34	26th Dec.
1871, ...	11.23	8.18	13.00	7.40	2.38	4.72	12.58	5.67	6.55	9.63	10.70	14.90	106.94	3.80	9th Jan.
1872, ...	2.49	7.30	3.78	4.84	5.15	4.76	8.09	8.85	11.49	6.57	15.59	6.36	85.27	2.91	18th Sept.
1873, ...	6.78	9.64	10.28	13.86	6.57	3.70	4.65	5.53	2.93	9.96	12.58	4.98	91.46	4.40	21st May.
1874, ...	5.11	1.81	3.57	5.69	7.92	7.11	5.30	8.78	13.39	5.02	15.28	6.86	85.84	4.15	28th Nov.
1875, ...	2.72	8.37	14.65	7.20	3.54	10.54	2.81	8.59	8.49	8.02	10.47	7.35	93.25	3.74	4th Augt.
1876, ...	4.08	2.35	5.40	6.92	8.61	8.63	5.34	9.55	6.30	10.06	11.82	12.22	91.28	4.42	26th May.
1877, ...	2.45	5.94	7.17	0.49	5.20	13.26	5.70	4.35	2.05	2.06	6.82	10.77	66.26	5.20	16th June.
1878, ...	10.17	8.45	2.07	8.50	11.96	3.73	8.29	21.83	6.69	8.92	6.47	9.67	106.75	5.21	27th Augt.
1879, ...	16.94	9.65	9.62	5.90	11.68	6.06	6.16	11.48	4.48	16.24	8.88	9.87	116.96	3.80	5th Jan.
1880, ...	4.71	11.72	8.19	10.17	8.13	6.74	11.54	10.03	8.12	8.59	15.17	13.23	116.37	4.55	23rd Dec.
Average of 17 years.	7.03	6.22	6.85	8.16	6.50	6.70	6.52	9.35	6.78	8.38	10.92	10.53	93.94	6.34	26th Dec., 1870.

Greatest Annual Rainfall, 116.96 inches in 1879.
 Smallest do., " 1877.

TABLE IV.
Table shewing the number of Rainy Days according to the Registers noted below.

	Various.						Mr. J. D. VAUGHAN'S Register.					
	1820	1821	1822	1823	1824	1825	Aver- age.	1863	1864	1865	1866	Aver- age.
January,	Details not procurable.	Details not procurable.	16	21	Details not procurable.			22	20	13	17	18
February,			17	18				16	0	10	14	10
March,			17	11				10	8	8	8	8
April,			16	15				15	11	15	13	14
May,			15	20				13	10	11	14	12
June,			20	17				11	14	14	6	11
July,			11	14				10	16	17	19	15
August,			21	17				12	14	20	16	16
September,			13	15				15	15	13	14	14
October,			22	19				21	22	17	19	20
November,			26	23				13	18	17	16	16
December,			24	18				26	19	18	12	19
Total, ...	229	203	218	208	136	171	194	184	167	173	168	173
Smallest number in any year, 136 days in 1824. Greatest do., 229 " 1820.								Smallest number, 167 days in 1864. Greatest do., 184 " 1863.				

TABLE IV, —Continued.

Table shewing the number of Rainy Days according to the Registers noted below, —Continued.

Registered at the Criminal Prison.												
1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	Average.
12	24	19	6	18	16	9	11	4	21	24	15	15
12	21	21	20	18	10	13	7	10	13	14	13	14
8	14	22	11	18	15	22	9	9	5	15	16	14
16	17	8	13	18	12	16	11	7	13	13	15	13
16	10	14	12	14	13	16	10	10	17	15	13	13
11	17	13	16	13	10	14	17	12	8	8	12	12
13	11	19	17	11	16	9	7	13	12	10	13	13
18	17	20	14	13	15	14	11	6	16	13	15	14
12	18	20	17	11	14	12	14	2	7	11	18	13
15	17	20	19	22	12	14	16	8	11	18	14	16
21	25	20	23	23	22	18	18	12	17	16	19	20
26	18	16	18	20	17	15	15	16	21	18	16	18
180	209	212	186	199	172	172	146	109	161	175	179	175
Total,...												

Smallest number in any year 109 days in 1877.
Greatest do. 212 " 1871.

Smallest number in any year	109 days in 1877.
Greatest	212 " 1871.

TABLE V.

Table shewing the number of Rainy Days from 1864 to 1880, as recorded by A. Knight, Esq., at Mount Pleasant, Thompson Road.

	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	Average.
January,...	19	14	21	15	15	15	25	24	4	16	19	11	14	7	22	28	21	17
February,	2	12	17	19	9	12	25	21	17	19	15	14	7	20	18	17	14	15
March, ...	12	9	14	8	13	15	17	26	11	19	20	24	18	14	6	25	18	16
April, ...	11	22	17	22	22	22	18	15	16	20	21	21	15	5	22	18	16	18
May, ...	13	15	19	12	16	24	12	14	13	14	18	17	17	15	22	20	20	17
June, ...	13	15	9	15	11	14	20	18	20	13	16	13	17	13	20	15	18	15
July, ...	16	16	17	19	24	13	9	20	19	13	20	9	12	10	15	20	13	16
August, ...	16	22	18	11	15	20	19	20	20	15	19	15	14	9	21	21	18	17
September,	17	13	11	18	14	15	24	21	18	7	16	13	16	7	13	13	20	15
October,...	24	20	18	25	17	15	15	18	27	18	18	23	22	8	14	27	15	19
November,	25	19	22	24	26	26	27	23	27	22	25	24	23	15	18	19	24	23
December,	24	24	11	21	26	29	21	18	19	23	20	19	25	21	24	21	20	21
Total,...	192	201	194	209	208	220	232	238	211	199	227	208	200	144	215	244	217	209

Smallest number in any year, 144 days in 1877.
 Greatest do., 244 " 1879.

TABLE VI.

Table shewing the greatest Consecutive Number of Days without Rain, in each month, as observed at the Criminal Prison, from 1869 to 1880.

	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	Average.
January,	7	2	3	9	4	4	11	11	14	5	2	5	7
February,	4	2	4	4	4	7	7	11	12	5	5	7	6
March, ...	12	7	3	8	8	8	2	9	13	9	6	4	7
April, ...	2	4	13	10	3	6	4	4	7	4	7	3	5
May, ...	2	9	4	5	3	4	8	6	12	4	7	6	6
June, ...	5	6	3	4	7	4	5	4	8	13	9	5	6
July, ...	5	15	3	6	5	8	11	7	4	5	9	5	7
August, ...	3	4	2	6	10	4	7	11	17	4	3	5	6
September,	6	5	2	6	8	4	9	7	12	8	7	3	7
October,	4	6	4	4	2	4	4	7	17	14	4	6	6
November,	2	2	2	2	2	2	4	3	4	4	7	3	3
December,	1	3	8	4	3	4	10	4	5	3	4	4	4
Longest period during the year,	12	15	13	10	10	8	11	11	17	14	9	7	

TABLE VII.

Table shewing the greatest Consecutive Number of Days without Rain, in each month, as observed by A. KNIGHT, Esq., from 1864 to 1880, at Mount Pleasant, Thompson Road.

	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	Average.
January,	6	6	2	6	6	5	3	4	13	6	3	10	10	8	4	2	5	5
February,	19	12	3	6	13	4	1	3	4	4	8	4	11	3	2	4	8	6
March,	...	8	5	23	4	9	5	1	5	8	7	2	5	8	9	2	3	7
April,	6	2	3	3	6	2	4	7	4	3	2	5	4	6	3	7	3	4
May,	4	7	4	5	5	2	8	4	6	3	5	7	3	8	2	5	3	5
June,	5	7	18	3	11	5	4	5	3	9	9	5	2	8	4	7	4	6
July,	...	5	3	6	5	7	15	3	4	4	5	10	5	4	4	5	6	6
August,	...	3	5	6	3	3	3	2	4	6	4	7	6	9	3	2	4	4
September,	...	7	5	6	9	5	2	2	5	11	4	7	7	7	6	7	4	6
October,	2	3	5	2	5	5	8	4	1	3	4	4	4	11	6	2	6	5
November,	1	2	2	2	2	2	1	3	1	3	2	1	3	4	4	2	1	2
December,	2	4	7	5	2	1	4	7	4	2	3	5	2	3	2	3	2	3
Longest period during the year, ...}	19	12	18	23	13	9	15	7	13	11	9	10	11	11	9	7	8	

TABLE VIII.
Arrangement of the Rainfall registered at the Criminal Prison by Monsoons.

North-East Monsoon.														Remarks.																
1869.		1869-70.		1870-71.		1871-72.		1872-73.		1873-74.		1874-75.			1875-76.		1876-77.		1877-78.		1878-79.		1879-80.		Average of 11 years.					
inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		inches.		N. E.—The average of only 11 years is taken owing to want of any record at this place for November and December, 1868. A similar table for Mr. Knirour's register would have been prepared but for the large size the return would have assumed.		
November,		8.24		11.50		14.63		13.52		15.72		20.53		16.16		15.88		5.21		10.73		8.21		12.76		12.76				
December,		20.66		18.13		15.19		7.98		5.68		7.55		6.72		9.90		5.48		9.76		8.02		10.46		10.46				
January, ..		18.25		11.56		2.83		7.81		3.58		2.53		4.31		2.81		13.81		20.00		4.46		8.36		8.36				
Total 1st half of N. E. Monsoon		47.15		41.19		32.65		29.31		24.98		30.61		27.19		28.59		24.50		40.49		20.69		31.58		31.58				
February, ..		7.80		7.27		8.25		10.94		2.72		6.35		2.61		7.04		6.28		8.45		7.71		6.86		6.86				
March, ...		3.15		14.05		3.36		11.44		2.61		20.93		4.35		4.78		1.90		12.36		7.67		7.88		7.88				
April, ...		8.81		3.33		3.97		10.90		5.70		8.70		8.52		1.80		9.83		6.65		13.37		7.41		7.41				
Total 2nd half		19.76		24.65		15.58		33.28		11.03		35.98		15.48		13.62		18.01		27.46		28.75		22.15		22.15				
Total N. E. Monsoon		66.91		65.84		48.23		62.59		36.01		66.59		42.67		42.21		42.51		67.95		49.44		53.73		53.73				

TABLE VIII.—*Continued.**Arrangement of the Rainfall registered at the Criminal Prison by Monsoons.—Continued.*

	1869.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.	Aver- age of 11 years.	Remarks.
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	
May, ...	9.19	5.01	4.13	6.13	8.13	4.54	5.69	7.95	3.60	11.17	12.00	8.53	6.99	
June, ...	6.81	11.51	5.56	5.03	5.54	5.91	8.14	13.34	13.53	4.13	9.16	5.74	7.96	
July, ...	5.42	5.11	12.17	5.44	3.14	5.92	4.53	4.51	7.21	5.14	4.57	8.86	6.06	
Total 1st half of S.W. Monsoon		21.63	21.86	16.60	16.81	16.37	18.36	25.80	24.34	20.44	25.73	23.13	21.01	
August, ...	12.31	11.36	8.51	9.27	6.55	11.82	9.41	9.84	4.78	17.36	8.42	9.10	9.68	
September, ...	3.13	12.62	9.12	12.82	3.05	9.74	9.58	7.72	3.27	3.27	6.18	4.20	7.43	
October, ...	5.11	9.99	14.92	6.22	8.30	8.83	9.74	12.55	1.68	6.57	14.21	8.86	9.26	
Total 2nd half		33.97	32.55	28.31	17.90	30.39	28.73	30.11	9.73	27.20	29.11	22.16	26.37	
Total S.W. Monsoon		55.60	54.41	44.91	34.71	46.76	47.09	55.91	34.07	47.64	54.81	45.29	47.38	
Total both Mon- soons ...		122.51	120.25	93.14	97.30	82.77	113.68	98.58	76.28	90.15	122.79	94.73	101.11	

South-West Monsoon.